BASIC MATH



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BASIC MATH

A. BASIC ARITHMETIC

- Foundation of modern day life.
- Simplest form of mathematics.

Four Basic Operations :

- Addition + plus sign
- Subtraction – minus sign
- Multiplication x multiplication sign
- Division ÷ division sign

Equal or Even Values = equal sign

1. Beginning Terminology

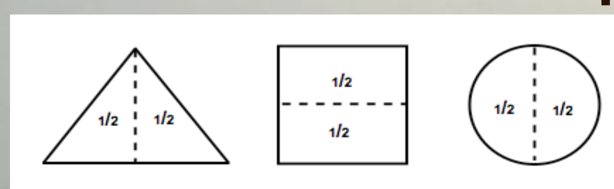
- **Numbers - Symbol or word used to express value or quantit**
  - **Arabic number system - 0,1,2,3,4,5,6,7,8,9**
- **Digits - Name given to place or position of each numeral.**

Number Sequence

Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Ones
8	7	6	5	4	3	2

2. Kinds of numbers

- **Whole Numbers - Complete units , no fractional parts. (43)**
  - **May be written in form of words. (forty-three)**
- **Fraction - Part of a whole unit or quantity. (1/2)**



2. Kinds of numbers (con't)

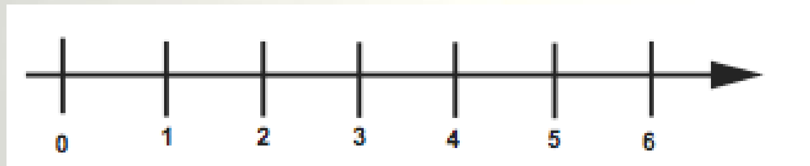
- Decimal Numbers - Fraction written on one line as whole no
Decimal Numbers
  - Position of period determines power of decimal.

	Tenths	Hundredths	Thousandths
.	0	0	5

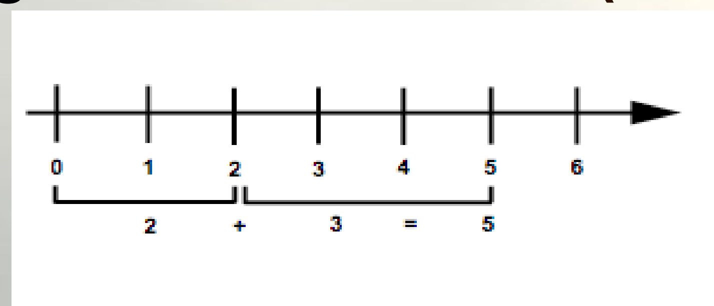
B. WHOLE NUMBERS

1. Addition

- **Number Line** - **Shows numerals in order of value**



- **Adding on the Number Line (2 + 3 = 5)**



- **Adding with pictures**



1. Addition (con't)

- **Adding in columns – Uses no equal sign**

Simple	Complex
5	897
+ 5	+ 368
10	1265

Answer is called "sum".

Table of Digits

2765
972
857
+ 1724
6318

Millions	Hundred-Thousands	Ten-Thousands	Thousands	Hundreds	Tens	Ones
			2	7	6	5
				9	7	2
				8	5	7
			1	7	2	4
			6	3	1	8

ADDITION PRACTICE EXERCISES

1.
   a. 222 + 222 = 444
   b. 318 + 421 = 739
   c. 611 + 116 = 727
   d. 1021 + 1210 = 2231

2.
   a. 813 + 267 = 1080
   b. 924 + 429 = 1353
   c. 618 + 861 = 1479
   d. 411 + 946 = 1357

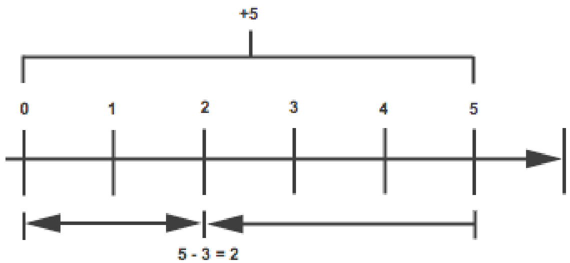
3.
   a. 813 + 222 + 318 = 1353
   b. 1021 + 611 + 421 = 2053
   c. 611 + 96 + 861 = 1568
   d. 1021 + 1621 + 6211 = 8853

Let's check our answers.

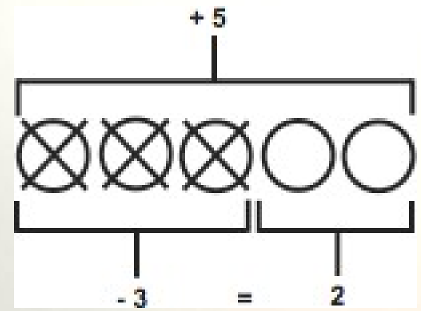
2. Subtraction

- **Number Line** Can show subtraction.

Number Line



Subtraction with pictures



Position larger numbers above smaller numbers.

If subtracting larger digits from smaller digits, borrow from next column.

$$\begin{array}{r} {}^{4}\not{5}\,{}^{1}3\ 8 \\ -\ 3\ 9\ 7 \\ \hline 1\ 4\ 1 \end{array}$$

SUBTRACTION PRACTICE EXERCISES

	a.	b.	c.	d.	e.
1.	6 - 3 = 3	8 - 4 = 4	5 - 2 = 3	9 - 5 = 4	7 - 3 = 4
2.	11 - 6 = 5	12 - 4 = 8	28 - 9 = 19	33 - 7 = 26	41 - 8 = 33
3.	27 - 19 = 8	23 - 14 = 9	86 - 57 = 29	99 - 33 = 66	72 - 65 = 7

Let's check our answers.

SUBTRACTION PRACTICE EXERCISES (con't)

	a.	b.	c.	d.
4.	387 - 241 = 146	399 - 299 = 100	847 - 659 = 188	732 - 687 = 45
5.	3472 - 495 = 2977	312 - 186 = 126	419 - 210 = 209	3268 - 3168 = 100
6.	47 - 38 = 9	63 - 8 = 55	47 - 32 = 15	59 - 48 = 11
7.	372 - 192 = 180	385 - 246 = 139	219 - 191 = 28	368 - 29 = 339

Let's check our answers.

3. Checking Addition and Subtraction

- **Check Addition - Subtract one of added numbers from sum. Result should produce other added number.**

```
   2        5       73
 + 8      + 3     + 48
  10        8      121
 - 8      - 3     - 48
   2        5       73
```

- **Check Three or more #s - Add from bottom to top.**

```
To Add ↓   927   ↑ To Check
           318
           426
           183
           927
```

- **Check Subtraction - Add subtracted number back.**

```
   5       62      103
 - 4     - 37     - 87
   1       25       16
 + 4     + 37     + 87
   5       62      103
```

CHECKING ADDITION & SUBTRACTION PRACTICE EXERCISES

1.
 a. 6 + 8 = 13
 b. 9 + 5 = 14
 c. 18 + 18 = 26
 d. 109 + 236 = 335

2.
 a. 87 -1 = 87
 b. 291 - 192 = 99
 c. 367 - 212 = 55
 d. 28 - 5 = 24

3.
 a. 34 + 12 = 46
 b. 87, 13, 195, 81, + 14
 c. 87, 13, 81, + 14 = 746
 d. 21 - 83 = 104

4.
 a. 28 - 16 = 22
 b. 361 - 361 = 0
 c. 2793142 - 1361101 = 1432141

Check these answers using the method discussed.

CHECKING ADDITION & SUBTRACTION PRACTICE EXERCISES

1.

a.
```
  6
+ 8
 13
- 8
  5
```

b.
```
  9
+ 5
 14
- 5
  9
```

c.
```
  18
+ 18
  26
- 18
   8
```

d.
```
  109
+ 236
  335
- 236
   99
```

2.

a.
```
  87
- 87
   1
+ 87
  88
```

b.
```
  291
- 192
   99
+ 192
  291
```

c.
```
  367
- 212
   55
+ 212
  267
```

d.
```
  28
-  5
  24
+  5
  29
```

3.

a.
```
  34
+ 12
  46
- 12
  34
```

b.
```
  195
   87
   13
   81
+  14
  195
```

c.
```
  949
  103
  212
  439
+ 195
  746
```

d.
```
   21
+  83
  104
-  83
   21
```

4.

a.
```
  28
- 16
  22
+ 16
  38
```

b.
```
  361
- 361
    0
+ 361
  361
```

c.
```
  2793142
- 1361101
  1432141
+ 1361101
  2793242
```

= Right

= Wrong

4. Multiplication

- In Arithmetic In Arithmetic - Indicated by “times” sign (x).

Learn “Times” Table

6 x 8 = 48

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

4. Multiplication (con't)

- **Complex Multiplication – Carry result to next column.**

Problem: 48 x 23

Step 1	Step 2	Step 3	Step 4
+ 2	+ 2	+ 1	+ 1
48	48	48	48
X 23	X 23	X 23	X 23
4	144	144	144
		6	960
			1104

Same process is used when multiplying three or four-digit problems.

MULTIPLICATION PRACTICE EXERCISES

	a.	b.	c.	d.
1.	21 x 4 = 84	81 x 9 = 729	64 x 5 = 320	36 x 3 = 108
2.	87 x 7 = 609	43 x 2 = 86	56 x 0 = 0	99 x 6 = 594
3.	24 x 13 = 312	53 x 15 = 795	49 x 26 = 1274	55 x 37 = 2035

Let's check our answers.

MULTIPLICATION PRACTICE EXERCISES (con't)

4. a. 94 x 73 = **6862** b. 99 x 27 = **2673** c. 34 x 32 = **1088** d. 83 x 69 = **5727**

5. a. 347 x 21 = **7287** b. 843 x 34 = **28,662** c. 966 x 46 = **44,436**

6. a. 360 x 37 = **13,320** b. 884 x 63 = **55,692** c. 111 x 19 = **2109**

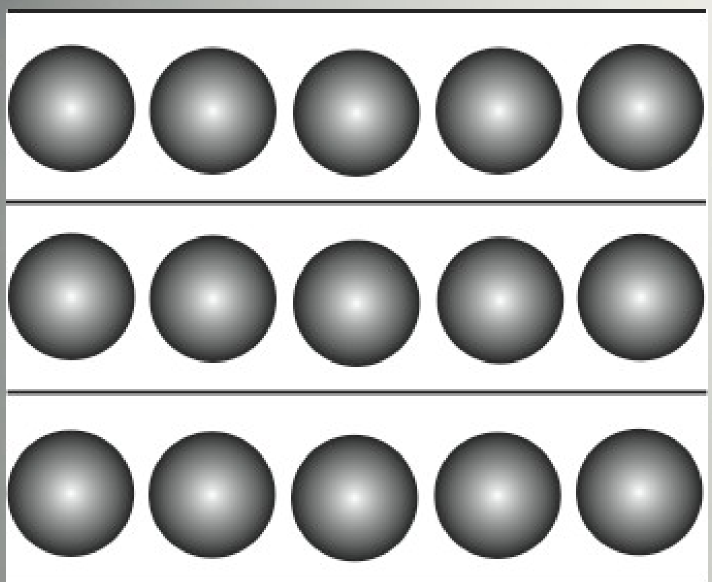
7. a. 493 x 216 = **106,488** b. 568 x 432 = **245,376** c. 987 x 654 = **645,498**

Let's check our answers.

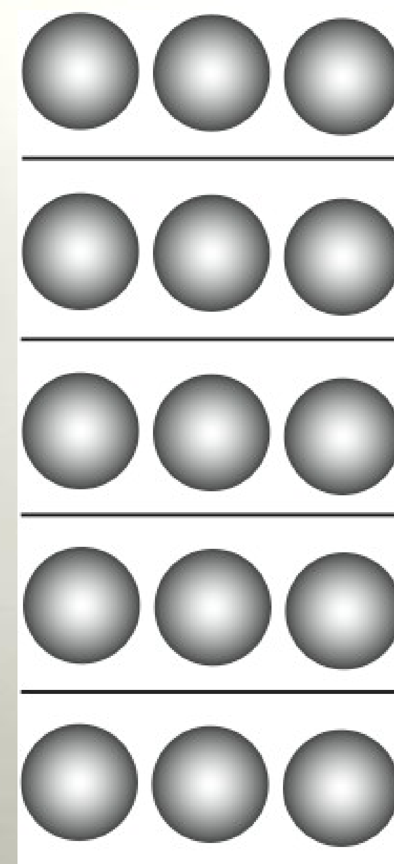
5. Division

- **Finding out how many times a divider "goes into" a whole number.**

$15 \div 5 = 3$



$15 \div 3 = 5$



5. Division (con’t)

- Shown by using a straight bar “ — “ or “ ⟌ “ sign.

```
      105
48 ⟌ 5040
     48
     ---
      240
      240
      ---
        0
```

- 48 “goes into” 50 one time.
- 1 times 48 = 48
- 50 minus 48 = 2 & bring down the 4
- 48 goes into 24 zero times.
- Bring down other 0.
- 48 goes into 240, five times
- 5 times 48 = 240
- 240 minus 240 = 0 remainder

So, 5040 divided by 48 = 105 w/no remainder.

Or it can be stated:

48 “goes into” 5040, “105 times”

DIVISION PRACTICE EXERCISES

	a.	b.	c.
1.	$48\overline{)5040}$ = 211	$7\overline{)434}$ = 62	$9\overline{)828}$ = 92
2.	$9\overline{)117}$ = 13	$12\overline{)3720}$ = 310	$10\overline{)1010}$ = 101
3.	$23\overline{)5888}$ = 256	$56\overline{)38472}$ = 687	
4.	$98\overline{)9604}$ = 98	$13\overline{)871}$ = 67	
5.	$50\overline{)2500}$ = 50	$789\overline{)97047}$ = 123	

Let's check our answers.

DIVISION PRACTICE EXERCISES (con't)

6. a. $21\overline{)147}$ = 7 b. $3\overline{)27000}$ = 9000

7. a. $32\overline{)1952}$ = 61 b. $88\overline{)8888}$ = 101

8. a. $87\overline{)5848}$ = 67 r 19 b. $15\overline{)12883}$ = 858 r 13

9. a. $994\overline{)12883}$ = 12 r 955 b. $352\overline{)8073}$ = 22 r 329

Let's check our answers.

C. FRACTIONS – A smaller part of a whole number.

A smaller part of a whole number.

Written with one number over the other, divided by a line.

$$\frac{3}{8} \quad \frac{11}{16} \quad \text{or} \quad {}^{3}\!/_{8} \quad {}^{11}\!/_{16}$$

Any number smaller than 1, must be a fraction.

Try thinking of the fraction as "so many of a specified number of parts".

For example: Think of 3/8 as "three of eight parts" or...
Think of 11/16 as "eleven of sixteen parts".

1. Changing whole numbers to fractions.

Multiply the whole number times the number of parts being considered.

Changing the whole number 4 to "sixths":

$$4 = \frac{4 \times 6}{6} = \frac{24}{6} \quad \text{or} \quad {}^{24}\!/_{6}$$

CHANGING WHOLE NUMBERS TO FRACTIONS EXERCISES

1. 49 to sevenths	$= \frac{49 \times 7}{7}$	$= \frac{343}{7}$	or	$343/7$
2. 40 to eighths	$= \frac{40 \times 8}{8}$	$= \frac{320}{8}$	or	$320/8$
3. 54 to ninths	$= \frac{54 \times 9}{9}$	$= \frac{486}{9}$	or	$486/9$
4. 27 to thirds	$= \frac{27 \times 3}{3}$	$= \frac{81}{3}$	or	$81/3$
5. 12 to fourths	$= \frac{12 \times 4}{4}$	$= \frac{48}{4}$	or	$48/4$
6. 130 to fifths	$= \frac{130 \times 5}{5}$	$= \frac{650}{5}$	or	$650/5$

Let's check our answers.

2. Proper and improper fractions.

Proper Fraction - Numerator is smaller number than denominator. 3/4

Improper Fraction - Numerator is greater than or equal to denominator. 15/9

3. Mixed numbers.

Combination of a whole number and a proper fraction.

4. Changing mixed numbers to fractions.

Change 3 7/8 into an improper fraction.

- Change whole number (3) to match fraction (eighths).

$$3 = \frac{3 \times 8}{8} = \frac{24}{8} \quad \text{or} \quad 24/8$$

- Add both fractions together.

$$24/8 + 7/8 = 31/8$$

CHANGING MIXED NUMBERS TO FRACTIONS EXERCISES

1. $4\ 1/2 = \frac{4 \times 2}{2} = \frac{8}{2} + \frac{1}{2} = \frac{9}{2}$

2. $8\ 3/4 = \frac{8 \times 4}{4} = \frac{24}{4} + \frac{3}{4} = \frac{27}{4}$

3. $19\ 7/16 = \frac{19 \times 16}{16} = \frac{304}{16} + \frac{7}{16} = \frac{311}{16}$

4. $7\ 11/12 = \frac{7 \times 12}{12} = \frac{84}{12} + \frac{11}{12} = \frac{95}{12}$

5. $6\ 9/14 = \frac{6 \times 14}{14} = \frac{84}{14} + \frac{9}{14} = \frac{93}{14}$

6. $5\ 1/64 = \frac{5 \times 64}{64} = \frac{320}{64} + \frac{1}{64} = \frac{321}{64}$

Let's check our answers.

5. Changing improper fractions to whole/mixed numbers.

Change 19/3 into whole/mixed number..

19/3 = 19 ÷ 3 = 6, remainder 1 = 6 1/3 (a mixed number)

CHANGING IMPROPER FRACTIONS TO WHOLE/MIXED NUMBERS EXERCISES

1. 37/7 = 37 ÷ 7 = 5, remainder 2 = 5 2/7 (a mixed number)
2. 44/4 = 44 ÷ 4 = 11, no remainder = 11 (a whole number)
3. 23/5 = 23 ÷ 5 = 4, remainder 3 = 4 3/5 (a mixed number)
4. 43/9 = 43 ÷ 9 = 4, remainder 7 = 4 7/9 (a mixed number)
5. 240/8 = 240 ÷ 8 = 30, no remainder = 30 (a whole number)
6. 191/6 = 191 ÷ 6 = 31, remainder 5 = 31 5/6 (a mixed number)

Let's check our answers.

6. Reducing Fractions

Reducing - Changing to different terms.

Terms - The name for numerator and denominator of a fraction.

Reducing does not change value of original fraction.

7. Reducing to Lower Terms

Divide both numerator and denominator by same number.

Example: $\frac{3}{9} = \frac{3 \div 3}{9 \div 3} = \frac{1}{3}$ $\frac{3}{9}$ & $\frac{1}{3}$ Have same value.

8. Reducing to Lowest Terms

Lowest Terms - 1 is only number which evenly divides both numerator and denominator.

Example: $\frac{16}{32} =$

a. $\frac{16 \div 2}{32 \div 2} = \frac{8}{16}$ b. $\frac{8 \div 2}{16 \div 2} = \frac{4}{8}$ c. $\frac{4 \div 2}{8 \div 2} = \frac{2}{4}$ d. $\frac{2 \div 2}{4 \div 2} = \frac{1}{2}$

REDUCING TO LOWER/LOWEST TERMS EXERCISES

1. Reduce the following fractions to LOWER terms:

a. $^{15}/_{20}$ to 4ths = $\frac{15 \div 5 =}{20 \div 5 =} \frac{3}{4}$

- Divide the original denominator (20) by the desired denominator (4) = 5..
- Then divide both parts of original fraction by that number (5).

b. $^{36}/_{40}$ to 10ths = $\frac{36 \div 4 =}{40 \div 4 =} \frac{9}{10}$

c. $^{24}/_{36}$ to 6ths = $\frac{24 \div 6 =}{36 \div 6 =} \frac{4}{6}$

d. $^{12}/_{36}$ to 9ths = $\frac{12 \div 4 =}{36 \div 4 =} \frac{3}{9}$

e. $^{30}/_{45}$ to 15ths = $\frac{30 \div 3 =}{45 \div 3 =} \frac{10}{15}$

f. $^{16}/_{76}$ to 19ths = $\frac{16 \div 4 =}{76 \div 4 =} \frac{4}{19}$

Let's check our answers.

REDUCING TO LOWER/LOWEST TERMS EXERCISES (con't)

2. Reduce the following fractions to LOWEST terms:

a. $6/10$ = a. $\frac{6 \div 2}{10 \div 2} = \frac{3}{5}$

b. $3/9$ = a. $\frac{3 \div 3}{9 \div 3} = \frac{1}{3}$

c. $6/64$ = a. $\frac{6 \div 2}{64 \div 2} = \frac{3}{32}$

d. $13/32$ = Cannot be reduced.

e. $32/48$ = a. $\frac{32 \div 2}{64 \div 2} = \frac{16}{32}$ b. $\frac{16 \div 2}{32 \div 2} = \frac{8}{16}$ c. $\frac{8 \div 8}{16 \div 8} = \frac{1}{2}$

f. $16/76$ = a. $\frac{16 \div 2}{76 \div 2} = \frac{8}{38}$ b. $\frac{8 \div 2}{38 \div 2} = \frac{4}{19}$

Let's check our answers.

9. Common Denominator

Two or more fractions with the same denominator.

$\frac{1}{8}$ $\frac{2}{8}$ $\frac{6}{8}$ $\frac{7}{8}$

When denominators are not the same, a common denominator is found by multiplying each denominator together.

$\frac{1}{6}$ $\frac{3}{8}$ $\frac{2}{9}$ $\frac{5}{12}$ $\frac{5}{18}$ $\frac{7}{24}$ $\frac{1}{36}$

6 x 8 x 9 x 12 x 18 x 24 x 36 = 80,621,568

80,621,568 is only one possible common denominator ... but certainly not the best, or easiest to work with.

10. Least Common Denominator (LCD)

Smallest number into which denominators of a group of two or more fractions will divide evenly.

10. Least Common Denominator (LCD) con't.

To find the LCD, find the "lowest prime factors" of each denominator.

1/6	3/8	2/9	5/12	5/18	7/24	1/36
2 x 3	2 x 2 x 2	3 x 3	2 x 3 x 2	2 x 3 x 3	3 x 2 x 2 x 2	2 x 2 x 3 x 3

The most number of times any single factors appears in a set is multiplied by the most number of time any other factor appears.

(2 x 2 x 2) x (3 x 3) = 72

Remember: If a denominator is a "prime number", it can't be factored except by itself and 1.

LCD Exercises (Find the LCD's)

1/6	1/8	1/12	1/12	1/16	1/24	3/10	4/15	7/20
2 x 3	2 x 2 x 2	2 x 3 x 2	2 x 2 x3	2 x 2 x 2 x 2	3 x 2 x 2 x 2	2 x 5	3 x 5	2 x 2 x 5

2 x 2 x 2 x 3 = 24

2 x 2 x 2 x 2 x 3 = 48

2 x 2 x 3 x 5 = 60

Let's check our answers.

11. Reducing to LCD

Reducing to LCD can only be done after the LCD itself is known.

1/6   3/8   2/9   5/12   5/18   7/24   1/36

(2 x 3   2 x 2 x 2   3 x 3   2 x 3 x 2   2 x 3 x 3   3 x 2 x 2 x 2   2 x 2 x 3 x 3)

LCD = 72

Divide the LCD by each of the other denominators, then multiply both the numerator and denominator of the fraction by that result.

1/6	3/8	2/9	5/12
72 ÷ 6 = 12	72 ÷ 8 = 9	72 ÷ 9 = 8	72 ÷ 12 = 6
1 x 12 = 12	3 x 9 = 27	2 x 8 = 16	5 x 6 = 30
6 x 12 = 72	8 x 9 = 72	9 x 8 = 72	12 x 6 = 72

Remaining fractions are handled in same way.

Reducing to LCD Exercises

Reduce each set of fractions to their LCD.

$\frac{1}{6}$ $\frac{1}{8}$ $\frac{1}{12}$

2 x 3 2 x 2 x 2 2 x 3 x 2

2 x 2 x 2 x 3 = 24

$\frac{1}{6}$: 24 ÷ 6 = 4; $\frac{1 \times 4}{6 \times 4} = \frac{4}{24}$

$\frac{1}{8}$: 24 ÷ 8 = 3; $\frac{1 \times 3}{8 \times 3} = \frac{3}{24}$

$\frac{1}{12}$: 24 ÷ 12 = 2; $\frac{1 \times 2}{12 \times 2} = \frac{2}{24}$

$\frac{1}{12}$ $\frac{1}{16}$ $\frac{1}{24}$

2 x 2 x3 2 x 2 x 2 x 2 3 x 2 x 2 x 2

2 x 2 x 2 x 2 x 3 = 48

$\frac{1}{12}$: 48 ÷ 12 = 4; $\frac{1 \times 4}{12 \times 4} = \frac{4}{48}$

$\frac{1}{16}$: 48 ÷ 16 = 3; $\frac{1 \times 3}{16 \times 3} = \frac{3}{48}$

$\frac{1}{24}$: 48 ÷ 24 = 2; $\frac{1 \times 2}{24 \times 2} = \frac{2}{48}$

$\frac{3}{10}$ $\frac{4}{15}$ $\frac{7}{20}$

2 x 5 3 x 5 2 x 2 x 5

2 x 2 x 3 x 5 = 60

$\frac{3}{10}$: 60 ÷ 10 = 6; $\frac{3 \times 6}{10 \times 6} = \frac{18}{60}$

$\frac{4}{15}$: 60 ÷ 15 = 4; $\frac{4 \times 4}{15 \times 4} = \frac{16}{60}$

$\frac{7}{20}$: 60 ÷ 20 = 3; $\frac{7 \times 3}{20 \times 3} = \frac{21}{60}$

Let's check our answers.

12. Addition of Fractions

All fractions must have same denominator.
Determine common denominator according to previous process.
Then add fractions.

$$\frac{1}{4} + \frac{2}{4} + \frac{3}{4} = \frac{6}{4} = 1\frac{1}{2}$$

Always reduce to lowest terms.

13. Addition of Mixed Numbers

Mixed number consists of a whole number and a fraction. (3 1/3)

- Whole numbers are added together first.
- Then determine LCD for fractions.
- Reduce fractions to their LCD.
- Add numerators together and reduce answer to lowest terms.
- Add sum of fractions to the sum of whole numbers.

Adding Fractions and Mixed Numbers Exercises

Add the following fractions and mixed numbers, reducing answers to lowest terms.

1. $\frac{3}{4} + \frac{3}{4} =$

$\frac{6}{4} = 1\frac{1}{2}$

2. $\frac{2}{5} + \frac{7}{10} =$

$\frac{4}{10} + \frac{7}{10} = \frac{11}{10}$

$= 1\frac{1}{10}$

3. $\frac{9}{32} + \frac{15}{16} =$

$\frac{9}{32} + \frac{30}{32} = \frac{39}{32}$

$= 1\frac{7}{32}$

4. $5\frac{2}{5} + 1\frac{3}{4} =$

5 + 1 = 6

$\frac{8}{20} + \frac{15}{20} = \frac{23}{20}$

$= 1\frac{3}{20} + 6 \quad = 7\frac{3}{20}$

Let's check our answers.

14. Subtraction of Fractions

Similar to adding, in that a common denominator must be found first. Then subtract one numerator from the other.

$$\frac{20}{24} - \frac{14}{24} = \frac{6}{24}$$

To subtract fractions with different denominators: $\frac{5}{16}$ (- $\frac{1}{4}$)

- **Find the LCD...**

$$\frac{5}{16} \quad - \quad \frac{1}{4}$$

2 x 2 x 2 x 2   2 x 2

2 x 2 x 2 x 2 = 16

- **Change the fractions to the LCD...**

$$\frac{5}{16} \quad - \quad \frac{4}{16}$$

- **Subtract the numerators...**

$$\frac{5}{16} - \frac{4}{16} = \frac{1}{16}$$

15. Subtraction of Mixed Numbers

- Subtract the fractions first. (Determine LCD)

$10\frac{2}{3} - 4\frac{1}{2}$

$3 \times 2 = 6$ (LCD)

- Divide the LCD by denominator of each fraction.

$6 \div 3 = 2$ $6 \div 2 = 3$

- Multiply numerator and denominator by their respective numbers.

$\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$ $\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$

- Subtract the fractions.

$\frac{4}{6} - \frac{3}{6} = \frac{1}{6}$

- Subtract the whole numbers.

$10 - 4 = 6$

- Add whole number and fraction together to form complete answer.

$6 + \frac{1}{6} = 6\frac{1}{6}$

15. Subtraction of Mixed Numbers (con't)

Borrowing

- Subtract the fractions first. (Determine LCD)

$5\frac{1}{16} - 3\frac{3}{8}$ **becomes** $5\frac{1}{16} - 3\frac{6}{16}$

(LCD) = 16

- Six-sixteenths cannot be subtracted from one-sixteenth, so 1 unit ($\frac{16}{16}$) is borrowed from the 5 units, leaving 4.

- Add $\frac{16}{16}$ to $\frac{1}{16}$ and problem becomes:

$$4\frac{17}{16} - 3\frac{6}{16}$$

- Subtract the fractions.

$\frac{17}{16} - \frac{6}{16} = \frac{11}{16}$

- Subtract the whole numbers.

4 - 3 = 1

- Add whole number and fraction together to form complete answer.

$1 + \frac{11}{16} = 1\frac{11}{16}$

Subtracting Fractions and Mixed Numbers Exercises

Subtract the following fractions and mixed numbers, reducing answers to lowest terms.

1. $\frac{2}{5} - \frac{1}{3} =$

$\frac{6}{15} - \frac{5}{15} = \frac{1}{15}$

2. $\frac{5}{8} - \frac{3}{12} =$

$\frac{15}{24} - \frac{6}{24} = \frac{9}{24} = \frac{3}{8}$

3. $47\frac{2}{5} - 28\frac{1}{3} =$

$47\frac{6}{15} - 28\frac{5}{15} = 19\frac{1}{15}$

4. $33\frac{1}{3} - 15\frac{2}{5} =$

$33\frac{5}{15} - 15\frac{6}{15} =$

$32\frac{20}{15} - 15\frac{6}{15} = 17\frac{14}{15}$

5. $101\frac{1}{4} - 57\frac{15}{16} =$

$101\frac{4}{16} - 57\frac{15}{16} =$

$100\frac{20}{16} - 57\frac{15}{16} = 43\frac{5}{16}$

6. $14\frac{3}{4} - 10\frac{5}{12} =$

$14\frac{9}{12} - 10\frac{5}{12} = 4\frac{4}{12} = 4\frac{1}{3}$

Let's check our answers.

16. MULTIPLYING FRACTIONS

- **Common denominator not required for multiplication.**

$$\frac{3}{4} \times \frac{4}{16}$$

1. **First, multiply the numerators.**

$$\frac{3}{4} \times \frac{4}{16} = \frac{12}{} =$$

2. **Then, multiply the denominators.**

$$\frac{3}{4} \times \frac{4}{16} = \frac{12}{64} =$$

3. **Reduce answer to its lowest terms.**

$$\frac{12}{64} \div \frac{4}{4} = \frac{3}{16}$$

17. Multiplying Fractions & Whole/Mixed Numbers

- Change to an improper fraction before multiplication.

$$\frac{3}{4} \times 4$$

1. First, the whole number (4) is changed to improper fraction.

$$\frac{4}{1}$$

2. Then, multiply the numerators and denominators.

$$\frac{3}{4} \times \frac{4}{1} = \frac{12}{4}$$

3. Reduce answer to its lowest terms.

$$\frac{12}{4} \div \frac{4}{4} = \frac{3}{1} = 3$$

18. Cancellation

- Makes multiplying fractions easier.
- If numerator of one of fractions and denominator of other fraction can be evenly divided by the same number, they can be reduced, or cancelled.

Example:

$$\frac{8}{3} \times \frac{5}{16} = \frac{\overset{1}{\cancel{8}}}{3} \times \frac{5}{\underset{2}{\cancel{16}}} =$$

$$\frac{1}{3} \times \frac{5}{2} = \frac{5}{6}$$

Cancellation can be done on both parts of a fraction.

$$\frac{\overset{1}{\cancel{12}}}{\underset{7}{\cancel{21}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{24}}} = \frac{1}{7} \times \frac{1}{2} = \frac{1}{14}$$

Multiplying Fractions and Mixed Numbers Exercises

Multiply the following fraction, whole & mixed numbers. Reduce to lowest terms.

1. $\frac{3}{4} \times \frac{4}{16} = \frac{3}{16}$

2. $26 \times \frac{1}{26} = 1$

3. $\frac{4}{5} \times 3 = 2\frac{2}{5}$

4. $\frac{9}{5} \times \frac{2}{3} = 1\frac{1}{5}$

5. $\frac{35}{4} \times \frac{4}{35} = 1$

6. $\frac{9}{10} \times \frac{3}{5} = \frac{27}{50}$

7. $\frac{1}{6} \times \frac{7}{12} = \frac{7}{72}$

8. $\frac{2}{3} \times \frac{5}{11} = \frac{10}{33}$

9. $5 \times \frac{77}{15} = 25\frac{2}{3}$

Let's check our answers.

19. Division of Fractions

- Actually done by multiplication, by inverting divisors.
- The sign " $\div$ " means "divided by" and the fraction to the right of the sign is always the divisor.

Example:

$$\frac{3}{4} \div \frac{1}{5} \text{ becomes } \frac{3}{4} \times \frac{5}{1} = \frac{15}{4} = 3\frac{3}{4}$$

20. Division of Fractions and Whole/Mixed Numbers

- Whole and mixed numbers must be changed to improper fractions.

Example:

$$3\frac{3}{16} \div 2\frac{1}{8} \text{ becomes } 16 \times 3 + \frac{3}{16} = \frac{51}{16} \text{ and } 2 \times 8 + \frac{1}{8} = \frac{17}{8}$$

$$\frac{51}{16} \div \frac{17}{8} \text{ Inverts to } \frac{51}{16} \times \frac{8}{17} = \frac{\overset{3}{\cancel{51}}}{\underset{2}{\cancel{16}}} \times \frac{\overset{1}{\cancel{8}}}{\underset{1}{\cancel{17}}} = \frac{3}{2} \times \frac{1}{1}$$

$$\frac{3}{2} \times \frac{1}{1} = \frac{3}{2} = 1\frac{1}{2}$$

Double Cancellation

Dividing Fractions,Whole/Mixed Numbers Exercises

Divide the following fraction, whole & mixed numbers. Reduce to lowest terms.

1. $\frac{5}{8} \div \frac{3}{6} = 1\frac{1}{4}$

2. $\frac{51}{16} \div \frac{3}{8} = 8\frac{1}{2}$

3. $18 \div \frac{1}{8} = 144$

4. $15 \div \frac{7}{12} = 25\frac{5}{7}$

5. $\frac{14}{3} \div \frac{7}{4} = 2\frac{2}{3}$

D. DECIMAL NUMBERS

1. Decimal System

- System of numbers based on ten (10).
- Decimal fraction has a denominator of 10, 100, 1000, etc.

Written on one line as a whole number, with a period (decimal point) in front.

$\frac{5}{10} = .5$ $\frac{5}{100} = .05$ $\frac{5}{1000} = .005$

3 digits

.999 is the same as $\frac{999}{1000}$

(1 + same number of zeros as digits in numerator)

2. Reading and Writing Decimals

$5\frac{7}{10}$ is written **5.7**

Whole Number → 5

Decimal Fraction (Tenths) → 7

$55\frac{7}{100}$ is written **55.07**

Whole Number → 55

Decimal Fraction (Hundredths) → 7

Decimal Fraction (Tenths) → 0

$555\frac{77}{1000}$ is written **555.077**

Whole Number → 555

Decimal Fraction (Thousandths) → 7

Decimal Fraction (Hundredths) → 7

Decimal Fraction (Tenths) → 0

2. Reading and Writing Decimals (con't)

- Decimals are read to the right of the decimal point.

.63 is read as "sixty-three hundredths."

.136 is read as "one hundred thirty-six thousandths."

.5625 is read as "five thousand six hundred twenty-five ten-thousandths."

3.5 is read "three and five tenths."

- Whole numbers and decimals are abbreviated.

6.625 is spoken as "six, point six two five."

One place	.0	tenths
Two places	.00	hundredths
Three places	.000	thousandths
Four places	.0000	ten-thousandths
Five places	.00000	hundred-thousandths

3. Addition of Decimals

- **Addition of decimals is same as addition of whole numbers except for the location of the decimal point.**

Add .865 + 1.3 + 375.006 + 71.1357 + 735

- **Align numbers so all decimal points are in a vertical column.**
- **Add each column same as regular addition of whole numbers.**
- **Place decimal point in same column as it appears with each number.**

```
      .8650
     1.3000     "Add zeros to help eliminate errors."
   375.0060
    71.1357
+  735.0000     "Then, add each column."
-----------
  1183.3067
```

4. Subtraction of Decimals

- Subtraction of decimals is same as subtraction of whole numbers except for the location of the decimal point.

Solve: 62.1251 - 24.102

- Write the numbers so the decimal points are under each other.
- Subtract each column same as regular subtraction of whole numbers.
- Place decimal point in same column as it appears with each number.

$$\begin{array}{r} 62.1251 \\ -\ 24.1020 \\ \hline 38.0231 \end{array}$$

"Add zeros to help eliminate errors."

"Then, subtract each column."

5. Multiplication of Decimals

Rules For Multiplying Decimals

- **Multiply the same as whole numbers.**
- **Count the number of decimal places to the right of the decimal point in both numbers.**
- **Position the decimal point in the answer by starting at the extreme right digit and counting as many places to the left as there are in the total number of decimal places found in both numbers.**

Solve: 38.639 X 2.08

```
    3 8 .6 3 9   ← Decimal point 3 places over.
x        2.0 8   ← Decimal point 2 places over.
--------------
   3 0 6  9 5 2
 7 7 2 7  8 0 0  "Add zeros to help eliminate errors."
--------------
8 0 .3 4 7 5 2   "Then, add the numbers."
```

Place decimal point 5 places over from right.

6. Division of Decimals

Rules For Dividing Decimals

- Place number to be divided (dividend) inside the division box.
- Place divisor outside.
- Move decimal point in divisor to extreme right. (Becomes whole number)
- Move decimal point same number of places in dividend. (NOTE: zeros are added in dividend if it has fewer digits than divisor).
- Mark position of decimal point in answer (quotient) directly above decimal point in dividend.
- Divide as whole numbers - place each figure in quotient directly above digit involved in dividend.
- Add zeros after the decimal point in the dividend if it cannot be divided evenly by the divisor.
- Continue division until quotient has as many places as required for the

Solve: 123.573 ÷ 137.4

6. Division of Decimals

```
                 .8 9 9 3
137.41 ) 2 3 . 5 7 3 0 0
         1 0 9   9 2
           1 3   6 5 3
           1 2   3 6 6
             1   2 8 7 0
             1   2 3 6 6
                   5 0 4 0
                   4 1 2 2
                     9 1 8 remainder
```

Decimal Number Practice Exercises

“WORK ALL 4 SECTIONS (+, −, X,)

1. Add the following decimals.

a. .6 + 1.3 + 2.8 = 4.7

b. 72.8 + 164.02 + 174.01 = 410.83

c. 185.7 + 83.02 + 9.013 = 277.733

d. 0.93006 + 0.00850 + 3315.06 + 2.0875 = 3318.08606

2. Subtract the following decimals.

a. 2.0666 - 1.3981 = 0.6685

b. 18.16 - 9.104 = 9.056

c. 1.0224 - .9428 = 0.0796

d. 1.22 - 1.01 = 0.21

e. 0.6 - .124 = 0.467

f. 18.4 - 18.1 = 0.3

g. 1347.008 - 108.134 = 1238.874

h. 111.010 - 12.163 = 98.847

i. 64.7 - 24.0 = 40.7

Let's check our answers.

Decimal Number Practice Exercises

3. Multiply the following decimals.

a. 3.01
x 6.20
18.662

b. 21.3
x 1.2
25.56

c. 1.6
x 1.6
2.56

d. 83.061
x 2.4
199.3464

e. 1.64
x 1.2
1.968

f. 44.02
x 6.01
264.5602

g. 63.12
x 1.12
70.6944

h. 183.1
x .23
42.113

i. 68.14
x 23.6
1608.104

Let's check our answers.

Decimal Number Practice Exercises

4. Divide the following decimals.

a. 3 0.5
1.4) 4 2.7 0

b. 5.7875
.8) 4.6 3000

c. 5 1 7
1.2) 6 2 0.4

d. 1.1 1 3 1
6) 6.6 7 8 6

e. 10 0
1.1) 110.0

Let's check our answers.

E. CHANGING FRACTIONS TO DECIMALS

A fraction can be changed to a decimal by dividing the numerator by the denominator.

Change $\frac{3}{4}$ to a decimal. $4\overline{)3.0}$ = .75

Decimal Number Practice Exercises

Write the following fractions and mixed numbers as decimals.

a. $\frac{6}{10}$ .6

b. $\frac{3}{5}$ .6

c. $\frac{4}{5}$ .8

d. $\frac{1}{5}$ .2

e. $\frac{1}{2}$ .5

f. $\frac{8}{20}$ .4

g. $\frac{7}{20}$ .35

h. $\frac{15}{20}$ .75

i. $\frac{7}{25}$ .28

j. $\frac{12}{25}$ .48

k. $\frac{17}{20}$ .85

l. $\frac{49}{50}$ .98

m. $1\frac{9}{10}$ 1.9

n. $1\frac{1}{25}$ 1.04

o. $6\frac{15}{25}$ 6.6

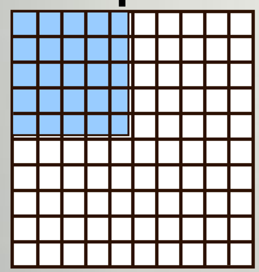
Let's check our answers.

F. PERCENTAGES

1. Percents

- Used to show how many parts of a total are taken out.
- Short way of saying "by the hundred or hundredths part of the whole".
- The symbol % is used to indicate percent.
- Often displayed as diagrams.

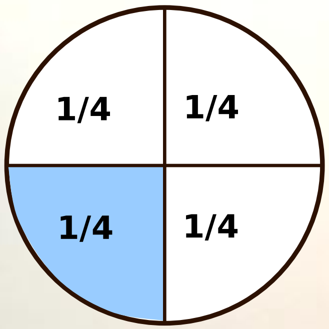
100 Equal Squares = 100%



25% or 25/100

or

4/4 = 100%



25/100 = 25%

To change a decimal to a %, move decimal point two places to right and write percent sign.

.15 = 15%
.55 = 55%
.853 = 85.3%
1.02 = 102%

"Zeros may be needed to hold place".

.8 = 80%

Percents Practice Exercises

Write as a decimal.

1. 35% = __.35__
2. 14% = __.14__
3. 58.5% = __.585__
4. 17.45% = __.1745__
5. 5% = __.05__

Write as a percent.

6. .75 = __75__%
7. 0.40 = __40__%
8. 0.4 = __40__%
9. .4 = __40__%

Let's check our answers.

Rules For Any Equivalent

To convert a number to its decimal equivalent, multiply by 0.01

Change 6 1/4% to its decimal equivalent.

- Change the mixed number to an improper fraction, then divide the numerator by the denominator.

6 1/4 = 25/4 = 6.25

- Now multiply the answer (6.25) times 0.01

6 .25 x 0.01 = 0.0625

Rules For Finding Any Percent of Any Number

- Convert the percent into its decimal equivalent.
- Multiply the given number by this equivalent.
- Point off the same number of spaces in answer as in both numbers multiplied.
- Label answer with appropriate unit measure if applicable.

Find 16% of 1028 square inches.

16 x .01 = .16
1028 x 0.16 = 164.48

Label answer: 164.48 square inches

2. Percentage

- **Refers to value of any percent of a given number.**
- **First number is called "base".**
- **Second number called "rate"... Refers to percent taken from base.**
- **Third number called "percentage".**

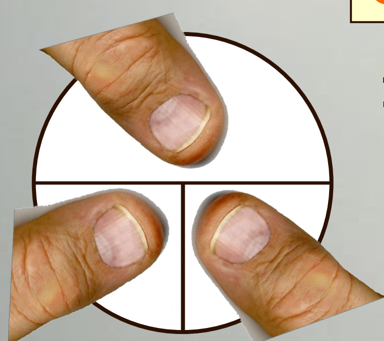
Rule: The product of the base, times the rate, equals the percentage.

Percentage = Base x Rate or $P = B \times R$

NOTE: Rate must always be in decimal form.

To find the formula for a desired quantity, cover it and the remaining factors indicate the correct operation.

Only three types of percent problems exist.



1. **Find the amount or rate.** $R = P \times B$
2. **Find the percentage.** $P = \frac{R}{B}$
3. **Find the base.** $B = \frac{R}{P}$

Percents Practice Exercises

1. Determine the rate or amount for each problem A through E for the values given.

	A.	B.	C.	D.	E.
BASE	2400 lbs	1875 gallons	148 feet	3268.5 Square inches	$ 875.00
PERCENT-AGE	80%	45%	15%	4 1/2%	19.5%
	1920 lbs.	843.75 Gal.	22.2 feet	147.08 sq.in.	$170.63
	A.	B.	C.	D.	E.

2. The labor and material for renovating a building totaled $25,475. Of this amount, 70% went for labor and the balance for materials. Determine: (a) the labor cost, and (b) the material cost.

a. $17,832.50 (labor) b. $ 7642.50 (materials)

3. 35% of 82 = 28.7

4. 14% of 28 = 4.32

5. Sales tax is 9%. Your purchase is $4.50. How much do you owe? $4.91

6. You have 165 seconds to finish your task. At what point are you 70% finished? 115.5 seconds

7. You make $14.00 per hour. You receive a 5% cost of living raise. How much raise per hour did you get? How much per hour are you making now? $.70 /hr raise Making $14.70 /hr

Let's check our answers.

G. APPLYING MATH TO THE REAL WORLD

1. 18 x 12 = 216
2. 240 x 8 = 30
3. 3.5 + 8.5 + 12 + 2.5 + 15 = 41.5
   55 - 41.5 = 13.5 gallons more
4. 1.5 x 0.8 = 1.2 mm
5. 5 x .20 = 1 inch
6. 2400 divided by 6 = 400 per person
   400 divided by 5 days = 80 per day per person
7. 6 x 200 = 1200 sq. ft. divided by 400 = 3 cans of dye
8. 2mm x .97 = 1.94 min   2mm x 1.03 = 2.06 max

Let's check our answers.

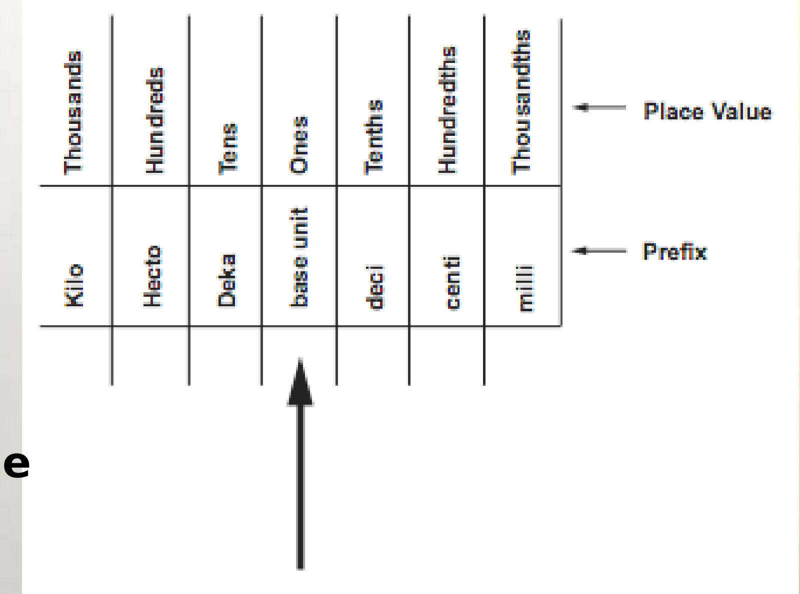
H. METRICS

1. Metrication

- Denotes process of changing from English weights and measures to the Metric system.
- U.S. is only major country not using metrics as standard system.
- Many industries use metrics and others are changing.

Metric Prefixes:

Kilo = 1000 units
Hecto = 100 units
Deka = 10 units
deci = 0.1 unit (one-tenth of the unit)
centi = 0.01 (one-hundredth of the unit)
milli = 0.001 (one thousandth of the unit)



Most commonly used prefixes are Kilo, centi, and milli.

A. Advantages of Metric System

- **Based on decimal system.**
- **No fractions or mixed numbers**
- **Easier to teach.**

Example 1:

Using three pieces of masking tape of the following English measurement lengths: 4 1/8 inches, 7 6/16 inches, and 2 3/4 inches, determine the total length of the tape

Step 1: Find the least common denominator (16). This is done because unequal fractions can't be added.

Step 2: Convert all fractions to the least common denominator.

Step 3: Add to find the sum.

Step 4: Change sum to nearest whole number.

4 1/8 = 4 2/16
7 9/16 = 7 9/16
2 3/4 = 2 12/16

13 23/16

14 7/16

"Now, compare with Example 2 using Metrics".

b. Advantages of Metric System

Example 2:

Using three pieces of masking tape of the following lengths: 85 mm, 19.4 cm, and 57 mm, determine the total length of the tape.

Step 1: Millimeters and centimeters cannot be added, so convert to all mm or cm.

Step 2: Add to find the sum.

85mm =
85mm
19.4cm =
194mm
57mm
57mm

336 mm

or

85mm =
8.5cm
19.4cm =
19.4cm
57mm
5.7cm

33.6 cm

“MUCH EASIER”

2. Metric Abbreviations

- Drawings must contain dimensions.
- Words like “inches, feet, millimeters, & centimeters take too much space.
- Abbreviations are necessary.

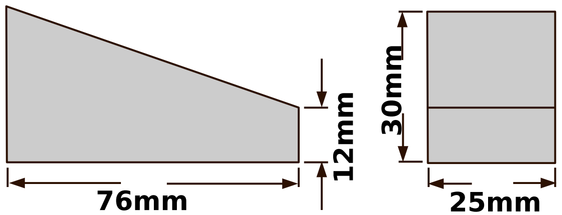
Metric Abbreviations:

mm = millimeter = one-thousandth of a meter

cm = centimeter = one-hundredth of a meter

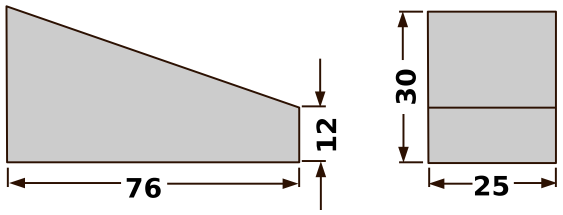
Km = Kilometer = one thousand meters

Dimensioned Drawing



SLIDE BLOCK

Dimensioned Drawing with Note for Standard Units



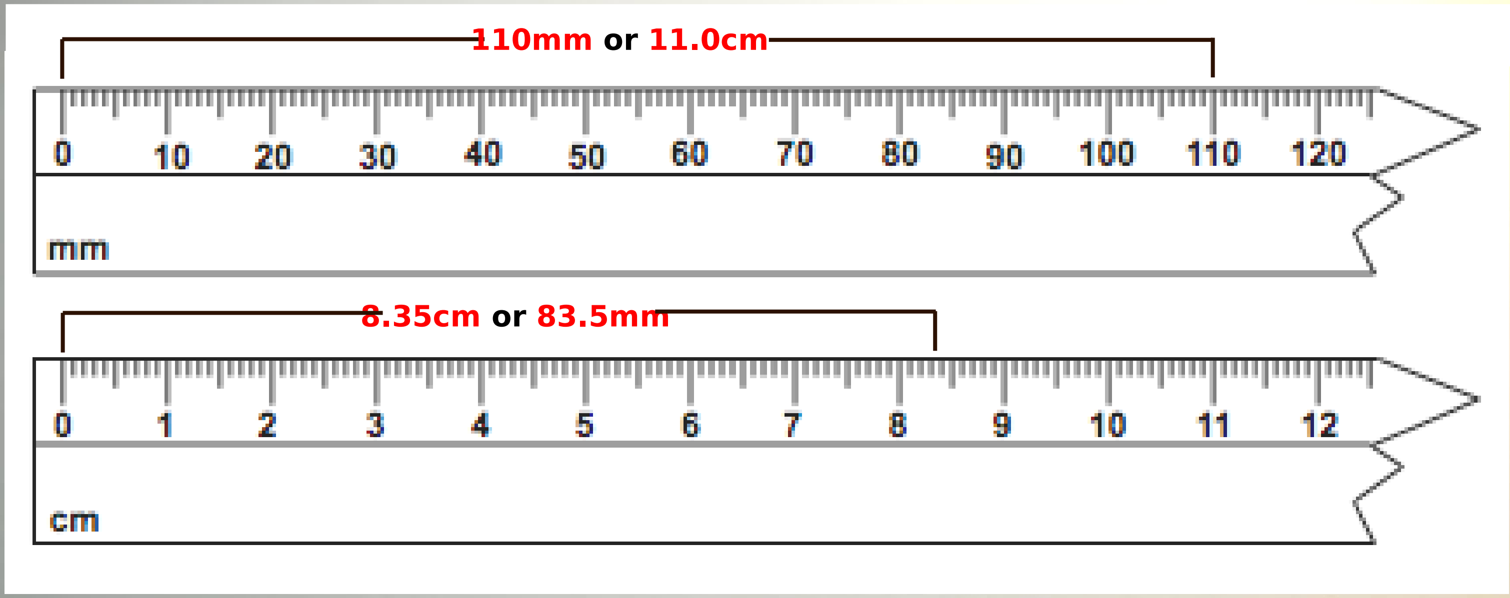
SLIDE BLOCK

NOTE: All dimensions are in millimeters.

3. The Metric Scale

- **Based on decimal system. Easy to read.**
- **Graduated in millimeters and centimeters.**

Metric Scales



- **Both scales graduated the same... Numbering is different.**
- **Always look for the abbreviation when using metric scales.**
- **Always place “0” at the starting point and read to end point.**

Metric Measurement Practice Exercises

Using a metric scale, measure the lines and record their length.

a.	109	mm
b.	81.5	mm
c.	3.1	cm
d.	103	mm
e.	6.3	cm
f.	80.5	mm
g.	10.85	cm
h.	23	mm
i.	91.5	mm
j.	4.25	cm

Let's check our answers.

4. Comparisons and Conversions

- Manufacturing is global business.
- Metrics are everywhere.
- Useful to be able to convert.

Compare the following:

One Yard: About the length between your nose and the end of your right hand with your arm extended.

One Meter: About the length between your left ear and the end of your right hand with your arm extended.

One Centimeter: About the width of the fingernail on your pink finger.

One Inch: About the length between the knuckle and the end of your index finger.

U.S. Customary and Metric Comparisons

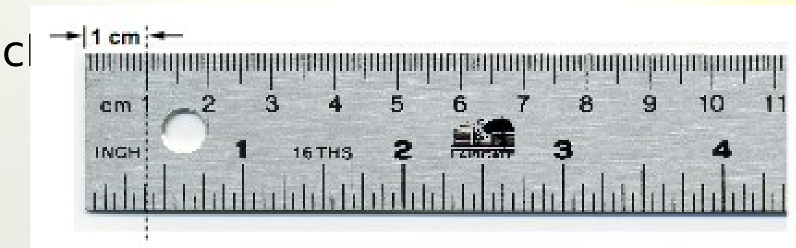
Length:

A Kilometer is a little over 1/2 mile - .62 miles to be more precise.

Mile

Kilometer

A centimeter is about 3/8 inch.

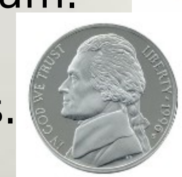


Weight:

A paper clip weighs about one gram.



A nickel weighs about five grams.



A Kilogram is 2.2 pounds. - Two packs of butter plus about 1 stick.



U.S. Customary and Metric Comparisons



Capacity:

One liter and one quart are approximately the same.

There are about 5 milliliters in a teaspoon.



Pressure is measured in newton meters instead of foot pounds.



Equivalent Units:

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
Kilo	Hecto	Deka	base unit	deci	centi	milli

← **Place Value** (top row)

← **Prefix** (bottom row)

To change to a smaller unit, move decimal to right. →

To change to a larger unit, move decimal to left. ←

Changing to a Smaller

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
Kilo	Hecto	Deka	base unit	deci	centi	milli

15 liters = 15000 milliliters (ml)

- **Count the number of places from the base unit to "milli". There are 3 places.**
- **Move the decimal 3 places to the right.**

15 liters = 15.000 liters = 15000ml

Changing to a Larger Unit

150 grams (g) = .150 Kilograms (Kg)

- **Count the number of places from the base unit to "Kilo". There are 3 places.**
- **Move the decimal 3 places to the left.**

150 grams = 150.00 grams = 0.150 Kg

Comparison and Conversion Practice Exercises

1. 1 liter = ______ ml **1000**
2. 6000 ml = ______ liters **6**
3. 10 cm = ______ mm **100**
4. 500 cm = ______ m **5.0**
5. 4 Kg = ______ g **4000**
6. 55 ml = ______ liters **.055**
7. 8.5 Km = ______ m **8500**
8. 6.2 cm = ______ mm **62**
9. 0.562 mm = ______ cm **.0562**
10. 75 cm = ______ mm **750**

Let's check our answers.

5. Conversion Factors

Conversion Table for Length

	mm	cm	meter	Km	inch	feet
1 millimeter =	1	.01	.001	.000001	25.4	.0394
1 centimeter =	10	1	10^{-2}	10^{-5}	.394	3.28×10^{-2}
1 meter =	1000	100	1	10^{-3}	39.4	3.28
1 Kilometer =	10^{6}	10^{5}	1000	1	3.94×10^{3}	3280
1 inch =	25.4	2.54	2.54×10^{-2}	2.54×10^{-5}	1	8.33×10^{-2}
1 foot =	305	30.5	.305	3.05×10^{-4}	12	1

Conversion Table for Area

	meter ^{2}	cm ^{2}	inch ^{2}	feet ^{2}
sq. meter =	1	10^{4}	10.8	1550
sq. centimeter =	10^{-4}	1	1.08×10^{-3}	0.155
sq. foot =	9.29×10^{2}	929	144	1
sq. inch =	6.45×10^{-4}	6.45	1	6.94×10^{-3}

5. Conversion Factors

Conversion of Volume

- Volume measures the total space occupied by three-dimensional objects or substances.
- Volume of six-sided spaces is calculated as “length x width x height”.
- Volume of spheres and cylinders is more complicated.
- Term “cubic” is used because it is a math function involving 3 factors.

2ft x 4ft x 3ft = 24 Cubic Feet

English

1 cubic inch = 1 cubic inch
1 cubic foot = 1728 cubic inches (12 x 12 x 12)
1 cubic yard = 27 cubic feet (3 x 3 x 3)

Metric

1 cubic meter = 1,000,000 cubic centimeters (100 x 100 x 100)
1 foot = .305 meters
and
1 meter = 3.28 feet

Factors can be converted before or after initial calculation.

5. Conversion Factors (con't)

Conversion Table for Pressure

	Nt./meter ^{2}	lb./in. ^{2}	lb./ft. ^{2}
1 Newton per meter	1	1.45×10^{-4}	2.09×10^{-2}
1 pound per inch	6.90×10^{3}	1	144
1 pound per foot	47.9	6.94×10^{-3}	1

Conversion Table for Weight

TO CONVERT	MULTIPLY BY	TO CONVERT	MULTIPLY BY
Grams to ounces	0.353	Ounces to grams	28.35
Grams to pounds	0.0022	Pounds to grams	453.592
Kilograms to pounds	2.2046	Pounds to kilograms	0.4536
Kilograms to tons	0.00098	Tons to kilograms	1016.05
Tonnes to tons	0.9842	Tons to tonnes	1.016

5. Conversion Factors (con't)

To convert between Celsius and Fahrenheit:

Fahrenheit to Celsius . . . . (^{o}F-32) x 5/9 = ^{o}C

Celsius to Fahrenheit . . . . (^{o}C x 9/5) + 32 = ^{o}F

Conversion Table for Temperature

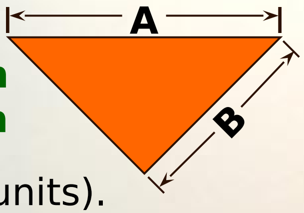
CELSIUS °C	FARENHEIT °F
-30	-22
-20	-4.0
-10	14
0	32.0
1	33.8
2	35.6
3	37.4
4	39.2
5	41.0
6	42.8
7	44.6
8	46.4
9	48.2

Metric System Practice Exercises

1. Which one of the following is **not** a metric measurement?
   - **a. millimeter**
   - **b. centimeter**
   - **c. square feet**
   - **d. cm**

2. Milli - is the prefix for which one of the following?
   - **a. 100 ones**
   - **b. 0.001 unit**
   - **c. 0.0001 unit**
   - **d. 0.00001 unit**

3. How long are lines A and B in this figure?



A = 53 mm, or 5.3 cm
B = 38 mm, or 3.8 cm

4. How long is the line below? (Express in metric units).

69 mm

5. Convert the following:
   - **a. 1 meter = __1000__millimeters**
   - **b. 5 cm = __50__millimeters**
   - **c. 12 mm = __1.2__centimeters**
   - **d. 7m = __700__centimeters**

Let's check our answers.

H. THE CALCULATOR



- **Functions vary from one manufacturer to the next.**
- **Most have same basic functions.**
- **More advanced scientific models have complicated applications.**
- **Solar models powered by sunlight or normal indoor light.**

1. Basic Keys:

On/Off Key: Turns calculator on or off. Solar unit will not have "off" key..

C/AC: Press once (C) to clear last entry - Press twice (AC) to clear all functions.

÷ Key: Controls the division function.

X Key: Controls the multiplication function.

- Key: Controls the subtraction function.

+ Key: Controls the addition function.

√ Key: Controls the square root function.

M+ Key: Adds a number or function to the memory register, to be recalled later.

M- Key: Subtracts number or function from memory register.

MR Key: Memory Recall recalls function stored in register.

MC Key: Memory Clear clears or erases all contents from memory.

% Key: Controls the percentage functions

2. Calculator Functions:

- Cannot give correct answer if given the wrong information or command.
- Decimals must be placed properly when entering numbers.
- Wrong entries can be cleared by using the C/AC button.
- Calculators usually provide a running total.

ADDITION

Add 3, 8, 9, and 14.

Step 1: Press “3” key - number 3 appears on screen..

Step 2: Press “+” key - number 3 remains on screen.

Step 3: Press “8” key - number 8 appears on screen.

Step 4: Press “+” key - running total of “11” appears on screen.

Step 5: Press the “9” key - number 9 appears on screen.

Step 6: Press “+” key - running total of “20” appears on screen.

Step 7: Press “1 & 4” keys - number 14 appears on screen.

Step 8: Press the = key - number 34 appears. This is the answer.

In step 8, pressing the + key would have displayed the total. Pressing the = key stops the running total function and ends the overall calculation.

Calculator Addition Exercise

Use the calculator to add the following.

1.
```
      .06783
      .49160
      .76841
      .02134
   +  .87013
   ----------
     2.21931
```

2.
```
     154758
       3906
       4123
       5434
   +     76
   --------
     168297
```

3. 12.54 + 932.67 + 13.4

= 958.61

Let's check our answers.

SUBTRACTION

SUBTRACT 25 FROM 187.

Step 1: Press 1, 8, and 7 keys - number 187 appears on screen..
Step 2: Press “-” key - number 187 remains on screen.
Step 3: Press 2 & 5 keys- number 25 appears on screen.
Step 4: Press “=” key - number 162 appears on screen. This is the answer.

In step 4, pressing the - key would have displayed the total.

Calculator Subtraction Exercise

Use the calculator to subtract the following.

1. .0543
   \- .0532
   0.0011

2. .0578
   \- .0463
   0.0115

3. 179853 - 4327
   = 175526

Let's check our answers.

MULTIPLICATION

MULIPLY 342 BY 174.

Step 1: Press 3, 4, and 2 keys - number 342 appears on screen..
Step 2: Press "X" key - number 342 remains on screen.
Step 3: Press 1, 7 & 4 keys- number 174 appears on screen.
Step 4: Press "=" key - number 59508 appears on screen. This is the answer.

Calculator Multiplication Exercise

Use the calculator to multiply the following.

1. 2.45 x 16 = **40.64**
2. 60.8 x 19 = **1155.2**
3. 12.8976 x 43.7 x 12.01 **= 6769.1376912**

Let's check our answers.

DIVISION

DIVIDE 66 BY 12.3

Step 1: Press the 6 key twice - number 66 appears on screen..
Step 2: Press "÷" key - number 66 remains on screen.
Step 3: Press 1, 2,. (decimal), & 3 keys- number 12.3 appears on screen.
Step 4: Press "=" key - number 5.3659 appears on screen. This is the answer.

Calculator Division Exercise

Use the calculator to divide the following.

1. .2961 ÷ 5 = 0.05922
2. 13.5678 ÷ 11.1 = 1.22232
3. .1765 ÷ .5 = 0.353

Let's check our answers.

PERCENTAGES

FIND 1.3% OF 50

Step 1: Press the 5 and 0 keys - number 50 appears on screen..
Step 2: Press " x " key - number 50 remains on screen.
Step 3: Press 1, . (decimal), & 3 keys- number 1.3 appears on screen.
Step 4: Press "%" key - number .065 appears on screen. This is the answer.

Calculator Percentages Exercise

Use the calculator to find the following percentages.

1. Find 5% of:

a. 150 = 7.5

b. 675 = 33.75

c. 100 = 5

2. Find 10% of:

a. 1250 = 125

b. 871 = 87.1

c. 202 = 20.2

3. Find 26% of

a. 260 = 67.6

b. 212 = 55.12

c. 1817 = 472.42

Let's check our answers.

That concludes the Basic Math portion of your training.